The EpiNotes Newsletter

NC DEPARTMENT OF HEALTH AND HUMAN SERVICES
Division of Public Health

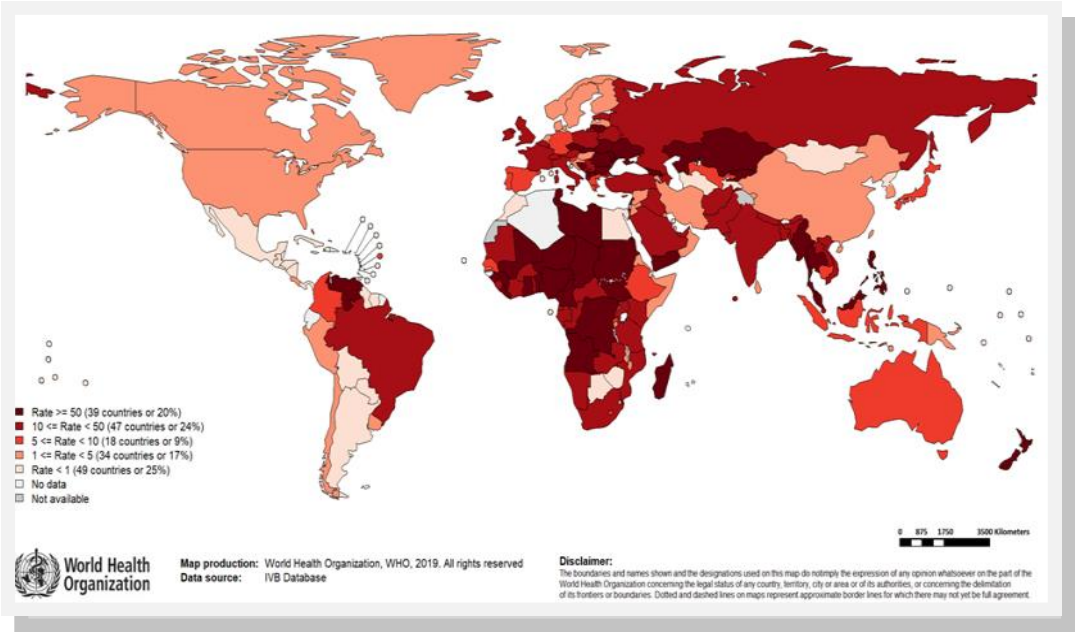
2019; Vol. 18 No. 2

Is Measles Coming Back?

Erica Wilson, MD

In the past year, cases of measles have increased worldwide; more cases were reported to WHO in the first six months of 2019 than in any year since 1992. In the Democratic Republic of the Congo, measles has killed more people than Ebola. Four countries, including the United Kingdom, recently lost measles elimination status, meaning a return of local measles transmission in those countries for at least 12 months.

Measles is a highly contagious vaccine preventable disease that was declared eliminated in North America in 2002 as the result of successful vaccine campaigns. Measles elimination in a country is defined by WHO as an absence of endemic transmission in that country for a period of 12 months or more. To achieve regional measles elimination, there must be an absence of endemic transmission in all member states for a period of 36 months or more.



The United States has been experiencing increasing numbers of measles cases since late 2018. Of the 2,387 measles cases reported to WHO from the Americas region in 2019, 49% (1,164) occurred in the United States.

Since measles elimination, measles cases and outbreaks that occurred in the United States have been the result of unvaccinated U.S. travelers returning from areas with active measles transmission. Of cases reported nationally in 2019, 75% are linked to outbreaks in New York, which were associated with travelers who brought measles back from Israel to a close knit community with a large number of unvaccinated individuals. No cases of measles have been identified in North Carolina during the first half of 2019. The last measles cases reported in North Carolina occurred in 2018 and were the result of an unvaccinated traveler returning from Europe. Overall vaccination rates among children in North Carolina are high (92–97%), though there are certain areas of the state with lower vaccination rates. Of most concern for measles outbreaks are close knit communities and schools with low vaccination rates.

The Division of Public Health (DPH) has taken a number of steps to prepare for measles in North Carolina including providing guidance to clinicians and local health departments to identify populations at risk for measles, implementing outbreak prevention strategies, and developing a measles toolkit for use in the event of a measles case. DPH also works with the North Carolina Immunization Program to ensure adequate vaccine supply.

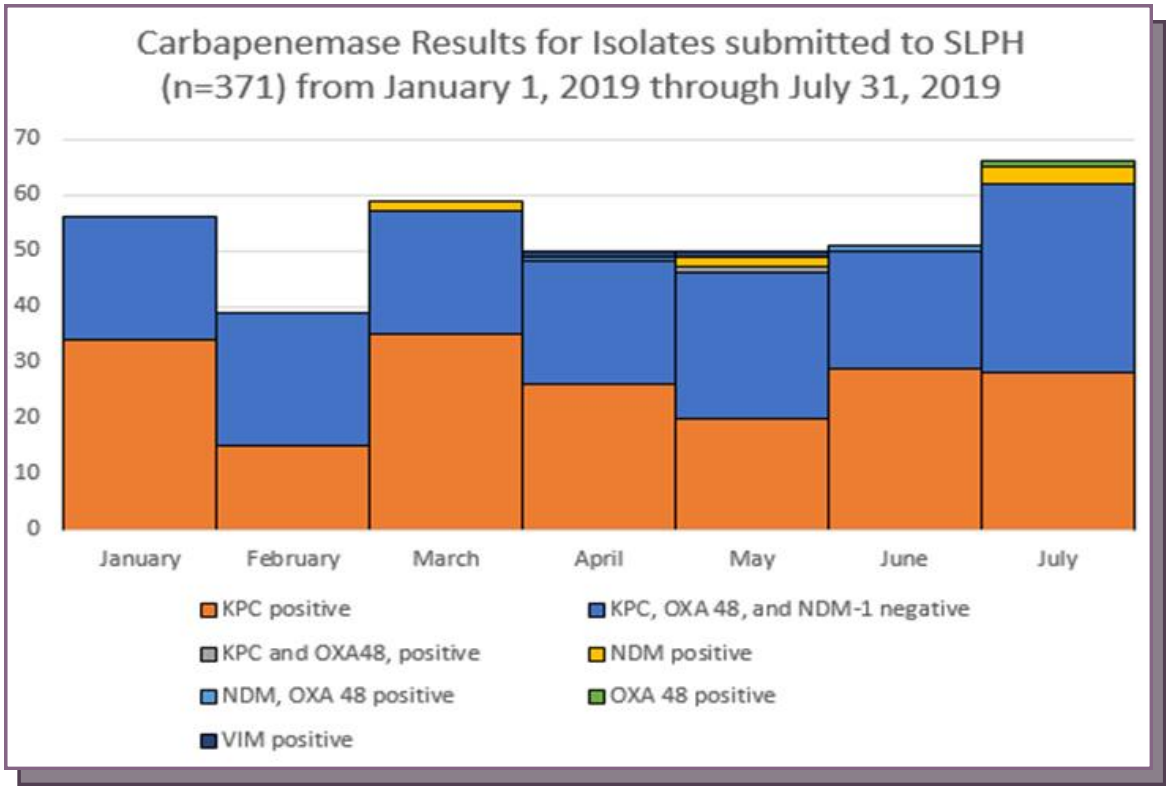
The best way to prevent measles remains vaccination. MMR vaccine is safe and effective.

Two doses of MMR vaccine are about 97% effective at preventing measles; one dose is about 93% effective. All adults born in 1957 or later should have at least one documented dose of measles vaccine or other proof of measles immunity. Those born after 1989 and adults who live or work in high risk settings such as post-secondary students and healthcare workers should have two doses of measles vaccine. Everyone should know and have documentation of their vaccination status.

Carbapenem resistant Enterobacteriaceae (CRE) Update

Savannah Carrico, MPH, Jennifer MacFarquhar, RN, MPH and James Lewis, MD

In conjunction with local health department communicable disease nurses, NC DPH has developed a systematic response to Carbapenemase Producing CRE (CP CRE) infections. We utilize the CDCs three tiered containment strategy (available at https://www.cdc.gov/hai/pdfs/containment/Health-Response-Contain-MDRO-H.pdf)to guide our response which includes infection prevention measures, screening and surveillance, with Tier 1 being most aggressive and Tier 3 least aggressive response.



Klebsiella pneumoniae carbapenemase (KPC) is endemic in North Carolina and is considered a Tier 3 organism. Non-KPC CP CRE, including imipenemase metallo-beta-lactamase (IMP), New Delhi metallo-beta-lactamase (NDM), verona integron-encoded metallo-beta-lactamase (VIM), and oxacillinase (OXA) carbapenemases, are considered Tier 2 organisms. A case of any CP CRE should be placed on appropriate precautions and, if possible, in a private room.

CP CRE identification at the North Carolina state laboratory of public health (NC SLPH)

We request that facilities and laboratories send CRE isolates to the NC SLPH. These isolates are tested for carbapenemase production by polymerase chain reaction (PCR) and modified carbapenem inactivation method (mCIM). From October 1, 2018 to September 30, 2019, 609 isolates were tested at the NC SLPH. 283 (46%) of these isolates tested positive for KPC. This is consistent with national data which found that 47% of isolates tested in 7 US metropolitan areas are positive for KPC. (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5853342/). In 2019, we have identified KPC, NDM-1, VIM and OXA-48. KPC makes up 94% of all carbapenemases detected. Three isolates had dual mechanisms of resistance. One isolate was positive for both KPC and OXA-48 and two isolates were positive for NDM-1 and OXA-48. These three isolates were unrelated.

CRE surveillance

Effective October 1, 2018, CP-CRE is reportable within 24 hours in NC. Events are reported and surveillance is conducted via our electronic surveillance system, NC Electronic Disease Surveillance System (NCEDSS). From February 2019 to September 30, 2019, 508 events were entered into NCEDSS. Each event was verified by the SHARPPS team and shared with the LHD CD staff for follow-up and response. Specific data elements of interest included risk history (e.g., history of travel), inpatient health care facility admissions (e.g., long term care), placement on appropriate precautions, and whether or not the patient has had a roommate. Once data are gathered, the SHARPPS team reviews and responds as appropriate.

Legionnaire's Disease Outbreak at the Mountain State Fair

By Katy Donovan, PhD

On September 23, 2019, the Buncombe County Department of Health and Human Services and Henderson County Health Department notified the North Carolina Division of Public Health (DPH) of an increase in reported Legionnaires' disease cases. By the end of the day, 14 confirmed and suspect cases had been identified. Early information gathered by local health departments and a Henderson County clinician indicated that most of these cases reported attending the NC Mountain State Fair, which ran from September 6–15 at the Western North Carolina Agricultural Center (WNC Ag Center) in Fletcher, NC.

As of October 30, DPH has confirmed 142 cases of Legionnaires' disease (134) or Pontiac Fever (8) in residents of multiple states and NC counties who attended the 2019 NC Mountain State Fair (Figure 1); 95 (69%) individuals were hospitalized and 4 died.

Beginning on September 23, DPH worked with the local public health staff and with the North Carolina Department of Agriculture and Consumer Services to develop a comprehensive list of aerosolized water sources to which fair attendees might have been exposed and to identify and address any possible sources of on-going exposure. Sources identified included hot tubs and diffusers that had been on display in the Davis Event Center and a cooling fan that had been located outside the Davis Event Center during the fair.

After establishing through interviews that the NC Mountain State Fair appeared to be the only common factor linking these cases, DPH notified the public on September 24; provided guidance to clinicians to consider Legionnaires' disease and laboratory testing; and encouraged anyone who had attended the fair and felt sick to seek care.

During September 25–27, DPH conducted a site visit to the WNC Ag Center with staff from the North Carolina Department of Agriculture and Consumer Services, the Buncombe County Department of Health and Human Services, and the Centers for Disease Control and Prevention (CDC) to identify any current sources of aerosolized water and collect environmental samples. Environmental samples were also collected from hot tubs that had been on display during the fair and from the cooling fan that had been present at the fair.

DPH conducted a case control study to identify the sources of exposure. The study included 60 people with confirmed Legionnaires' disease or Pontiac fever (cases) and 138 people who also attended the fair but did not get sick (controls). Study participants provided information through a survey (online or by phone) about the places they visited at the fair, including the amount of time they spent in particular areas.

Preliminary results from this study indicate that individuals who got sick were more likely to have visited the Davis Event Center; walked by or spent time at the hot tubs in the Davis Event Center; and attended during the latter half of the fair (September 11–15) (Table 1). Specifically, cases were 12 times more likely to have visited the Davis Event Center when compared with controls; 23 times more likely to report spending more than an hour in the Davis Event Center; more than 9 times more likely to report walking by or spending time by the hot tubs; and more than 36 times more likely to have attended the fair during the last five days (September 11–15).

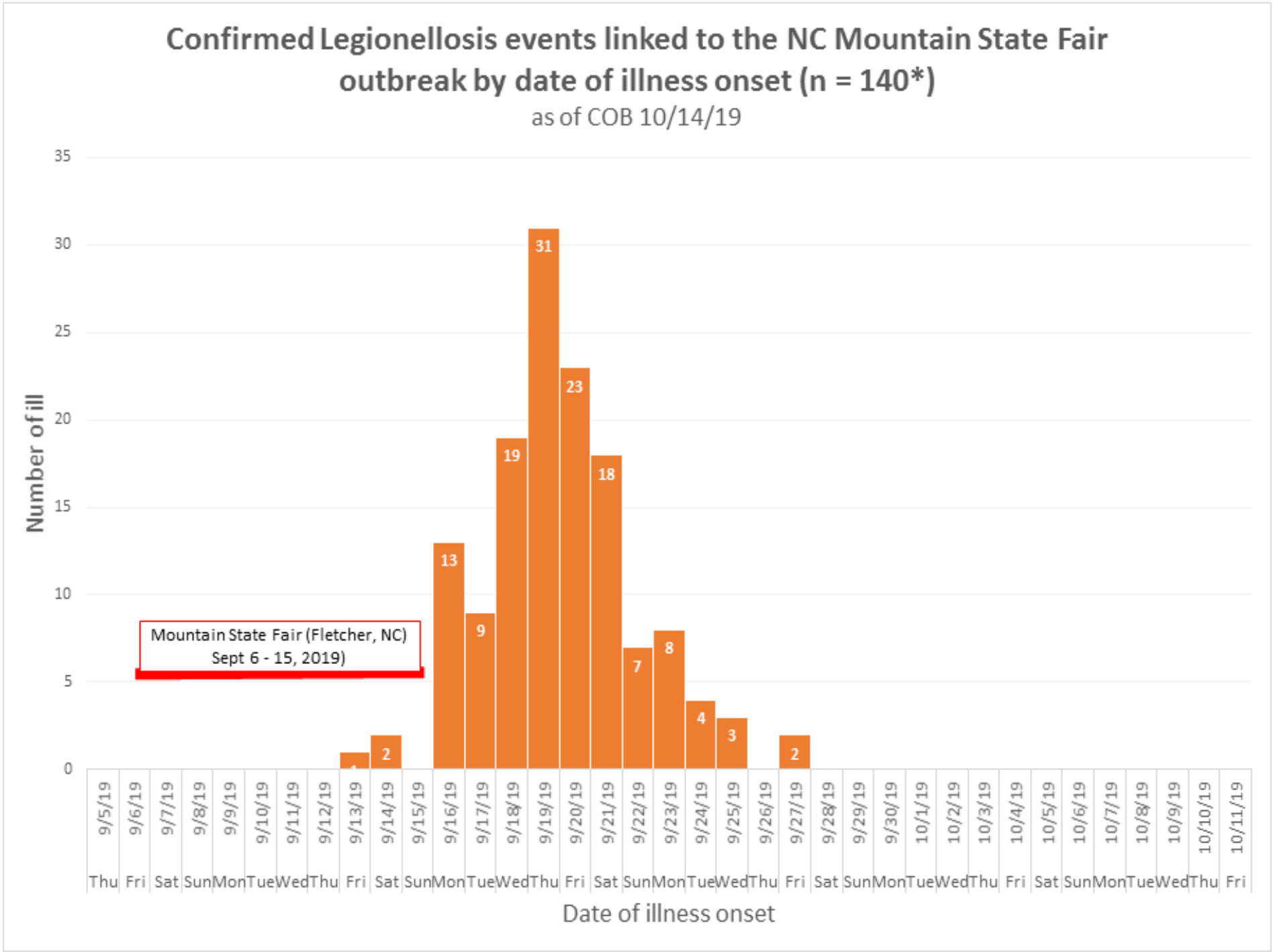
The preliminary epidemiologic and environmental findings suggest that exposure to legionella bacteria occurred in the Davis Event Center, particularly during the last five days of the fair. Hot tubs are a well established source of aerosolized water exposure and have been associated with previous Legionnaires' disease outbreaks nationally and internationally. People who visited the Davis Event Center, spent more than 1 hour in the building and attended the fair during the last five days were most likely to become ill. No significant sources of aerosolized water at the WNC Ag Center or other ongoing potential sources of exposure were identified and continuing surveillance for Legionnaires' disease cases indicates that the outbreak has ended. These results highlight the importance of caring for and maintaining equipment that can aerosolize water.

This report provides preliminary information from the investigation to date. This investigation has been conducted in collaboration with multiple local and state health departments, the North Carolina Department of Agriculture and Consumer Services, and with technical assistance from the Centers for Disease Control and Prevention.

For more information on Legionniare's Disease:

https://www.cdc.gov/legionella/about/index.html

https://epi.dph.ncdhhs.gov/cd/diseases/legionellosis.html


Confirmed Legionellosis events linked to the NC Mountain State Fair outbreak by date of illness onset (n = 140*)
as of COB 10/14/19
Number of ill
Date of illness onset
Mountain State Fair (Fletcher, NC)
Sept 6 - 15, 2019
35
30
25
20
15
10
5
0
2
13
9
19
31
23
18
7
8
4
3
2
9/5/19 Thu
9/6/19 Fri
9/7/19 Sat
9/8/19 Sun
9/9/19 Mon
9/10/19 Tue
9/11/19 Wed
9/12/19 Thu
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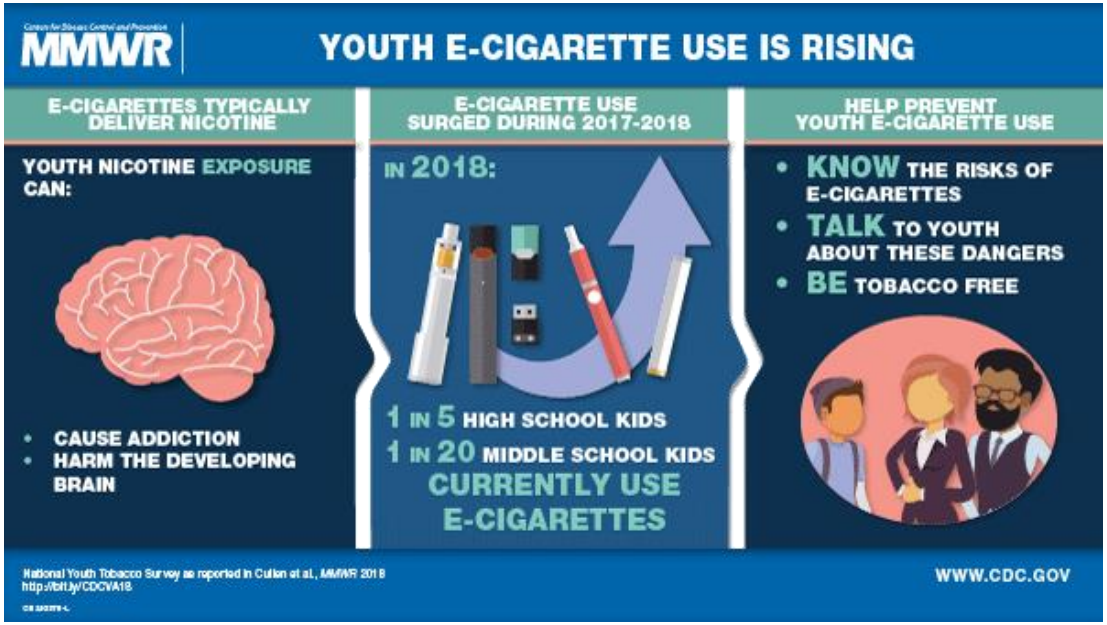
9/26/19 Thu
9/27/19 Fri
9/28/19 Sat
9/29/19 Sun
9/30/19 Mon
10/1/19 Tue
10/2/19 Wed
10/3/19 Thu
10/4/19 Fri
10/5/19 Sat
10/6/19 Sun
10/7/19 Mon
10/8/19 Tue
10/9/19 Wed
10/10/19 Thu
10/11/19 Fri

E-Cigarette or Vaping Product Use Associated Lung Injury — North Carolina, 2019

By Lauren Tanz, PhD and Ariel Christensen, MSPH

E-cigarette use, or vaping, is the inhalation of an aerosolized substance through a battery powered device, allowing tiny particles to travel deep into the lungs. E-cigarettes often contain nicotine, but can also be used to deliver tetrahydrocannabinol (THC; the psychoactive component of cannabis) and cannabidiol (CBD). Additionally, e-cigarette aerosol can contain other harmful substances including volatile organic compounds, heavy metals, such as lead and nickel, and flavoring, such as diacetyl. E-cigarettes are the most commonly used tobacco product among youth in North Carolina. During 2011–2017, e-cigarette use among NC high school students increased 894%, from 1.7% to 16.9%.



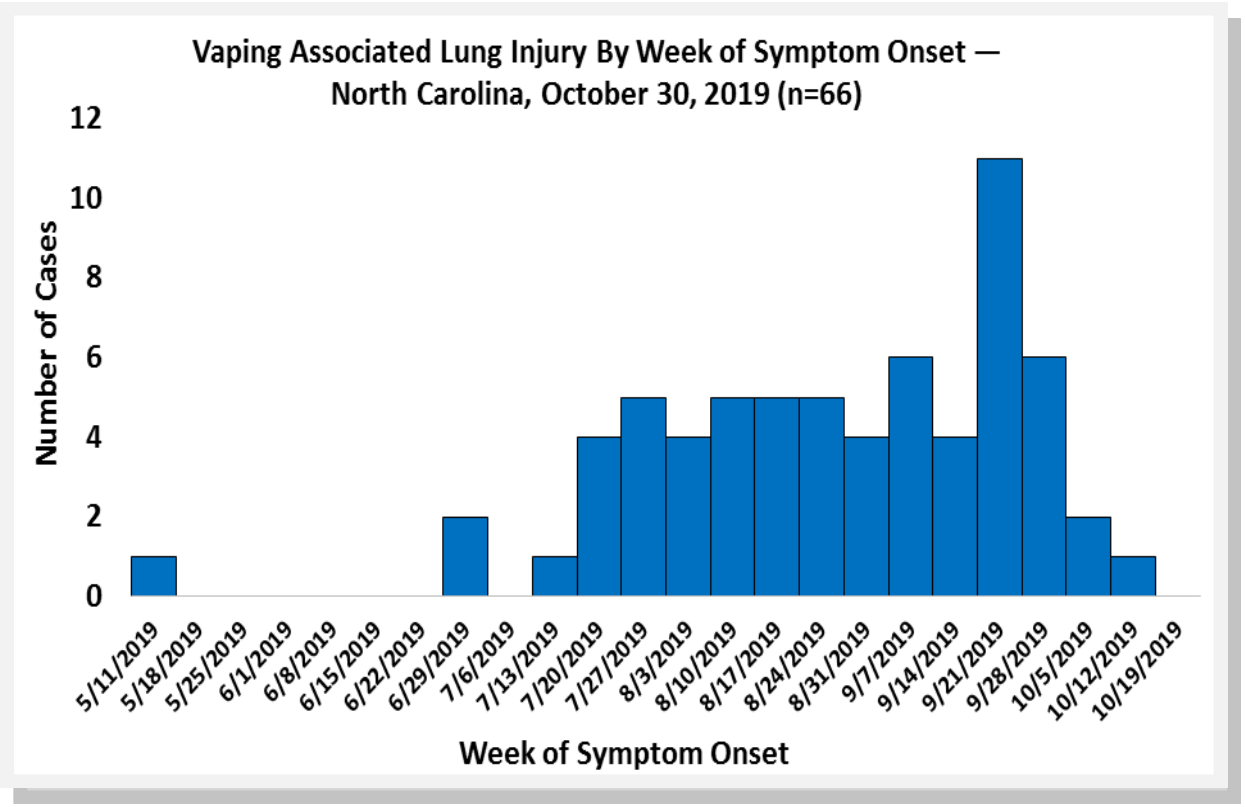
In July 2019, 8 cases of severe pulmonary disease among adolescents who used e-cigarette, or vaping, products were reported to the Wisconsin Department of Health Services. Patients presented with respiratory symptoms, including cough, shortness of breath, and fatigue, and worsened over a period of days or weeks before hospital admission. Chest radiographs showed pulmonary infiltrates, such as bilateral ground-glass opacities. Infectious etiologies were negative in all patients. As of October 29, 2019, 1,888 lung injury cases associated with the use of e-cigarette, or vaping, products have been reported to CDC from 49 states, the District of Columbia, and 1 U.S. territory. Thirty-seven deaths have been confirmed in 24 states.

The North Carolina Division of Public Health (NC DPH) was first notified of cases of lung injury associated with e-cigarette, or vaping, product use in the state on August 13, 2019. NC DPH subsequently issued a clinician memo requesting clinicians to report potential cases of lung injury associated with e-cigarette, or vaping, product use to North Carolina Poison Control. The outbreak case definition is as follows: Signs or symptoms of respiratory illness in a person who reports using an e-cigarette ("vaping") or "dabbing" in the 90 days prior to symptom onset; AND evidence of bilateral pulmonary infiltrates or opacities in chest radiograph or chest CT; AND absence of pulmonary infection on initial workup, with a minimum of negative results on influenza laboratory or rapid diagnostic testing; AND negative results from other clinically indicated respiratory infectious disease testing (confirmed case); Evidence of pulmonary infection on initial work-up, but clinical team caring for the patient believes this is not the sole cause of the underlying respiratory disease process or testing to rule out infection was not conducted (probable case) and no evidence in medical record of alternative plausible diagnoses (e.g., cardiac, rheumatologic, or neoplastic process).

As of October 30, 2019, 66 cases have been reported in individuals from 28 counties in North Carolina. The median age of patients was 25 years, ranging from 13 to 72 years and 62% were male. Patients commonly presented with respiratory symptoms, including cough (88%) and shortness of breath (83%), and gastrointestinal symptoms (79%). A total of 95% of patients were hospi-

talized, 42% required care in the intensive care unit, and 15% required intubation. Median length of hospitalization was 6 days, ranging from 0 to 56 days.

We conducted in-depth interviews with 20 patients to assess e-cigarette, or vaping, product use. All patients reported e-cigarette use in the 90 days prior to symptom onset. At least daily e-cigarette use was reported by 90% of patients. Most patients (80%) reporting using THC, 70% reported use of nicotine, and 30% reported use of CBD. Ten percent of patients reported exclusive use of nicotine products and 15% reported only using THC products; 50% of patients reported use of both THC and nicotine products. On average, patients reported using 2.2 devices (range: 1–7). E-cigarettes with pods or cartridges were most commonly reported (75%), although 35% reported use of e-cigarettes with refillable tanks and 40% reported use of mods. Hacking or modifying devices (10%), adding substances to prefilled cartridges (5%), and mixing their own liquids (0%) were rare. Among 16 patients who reported using THC products, 15 purchased them from a friend or dealer; 1 patient declined to answer. In contrast, 100% of patients who reported nicotine use, purchased products from a vape shop or other store (e.g., gas station) or online; 1 patient reported also obtaining nicotine products from another person.



We collected 96 products, including e-cigarettes, pods or cartridges, and packaging, from 10 patients. A total of 82 products were tested at the North Carolina State Laboratory of Public Health. Ninety percent contained THC, CBD, or Cannabinol and 9% contained nicotine. Vitamin E acetate was identified in 66% of products. Other substances found included terpenes (60%), glycerol (21%), and menthol (6%). All patients submitted at least one product that contained THC, CBD, or Cannabinol, 90% had a product that contained Vitamin E acetate, 70% had terpenes, 50% had glycerol, and 20% had at least one nicotine-containing product.

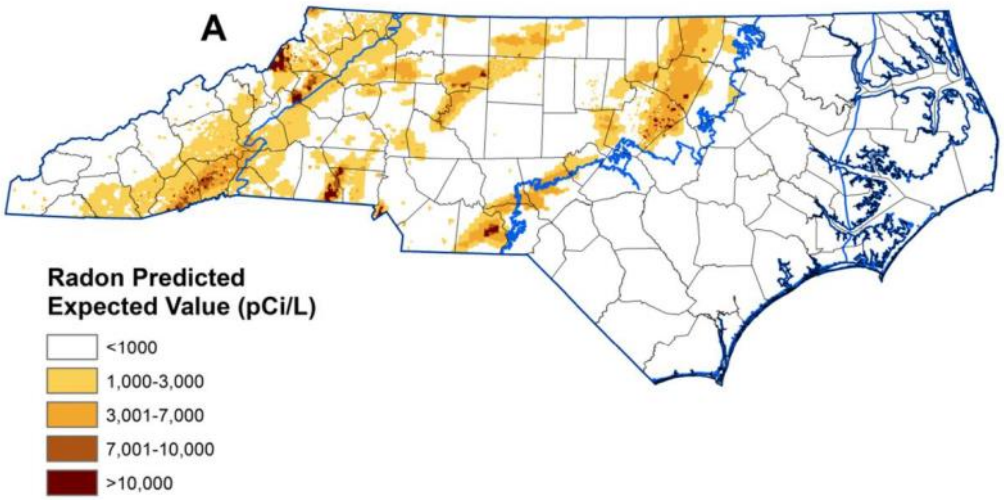
The specific exposure(s) causing this outbreak is unknown at this time. Both nationally and in North Carolina, most patients report use of THC-containing products with or without nicotine-containing products. While the investigation is ongoing, CDC recommends that persons should not use e-cigarette, or vaping, products that contain THC, should not buy any type of product, particularly those containing THC, off the street, and should not modify or add any substances to e-cigarette, or vaping, products that are not intended by the manufacturer. CDC also recommends that persons consider refraining from using e-cigarette, or vaping, products that contain nicotine.

Radionuclides in North Carolina – FAQs for Local Health Departments

1. What are radionuclides?
Radionuclides are elements that give off radiation as they break down. In nature, radionuclides can be found in rocks and soil and can get into ground water and into wells.

2. How do radionuclides get into well water?
Radionuclides can get into ground water and into wells if you live in an area where they are naturally present in the rocks and soil.

3. What areas of the state are more likely to have high levels of radionuclides in groundwater?
There are limited data on the occurrence of radionuclides in North Carolina. We do know that these elements are associated with certain types of rock formations deep underground. The following map shows areas that are more likely to have elevated radon in groundwater based on the location of these rock formations. Radon co-exists with uranium, radium and other radionuclides, so this map also indicates where other radionuclides might be elevated in groundwater. Areas in or around the colored portions of this map may be impacted by radionuclides.



4. I live in an area of concern based on the map. Do I have radionuclides in my well?
The presence of radionuclides in groundwater varies from neighbor to neighbor. You cannot smell, taste or see any of these contaminants. The only way to know is to get your well water tested.

5. I do not live in an area of concern based on the map. Should I be concerned about my well water?
The presence of radionuclides in groundwater varies from neighbor to neighbor. These contaminants may even be present in areas that are not generally predicted to have higher levels based on the underlying rock formations. The only way to know is to get your well water tested.

6. I don't have a private well. Should I be concerned?
If you receive water from a public water supply (community wells, county systems or municipal systems) your water is regulated by the NC Department of Environmental Quality to ensure your water does not exceed maximum contaminant levels for radionuclides. However, public water supply users may still be at risk from indoor radon in air that comes from other sources besides water.

7. Do I need to get my home tested for radon in the air?
Yes. The North Carolina Radiation Protection Section recommends that all homes and buildings in North Carolina be tested for radon. Radon is a gas that can enter your home through your floors/ foundation and from radon dissolved in groundwater. Testing for radon is important because breathing radon in indoor air can cause lung cancer.

8. What health problems are associated with radionuclides?
The health effects of radionuclides depend on which radionuclides you are exposed to. Generally, drinking water with elevated radionuclides have been linked to adverse health effects and cancer.

- Radon exposure has been linked to stomach cancer.
- Uranium exposure has been linked to kidney damage and cancer.
- Radium exposure has been linked to bone cancer.

In addition, breathing air with elevated radon is the second leading cause of

lung cancer, after cigarette smoke. If contaminant concentrations in your well water are elevated, you can contact the Occupational and Environmental Epidemiology Branch (OEEB) in the North Carolina Department of Health and Human Services at (919)-707-5900. The OEEB can answer questions regarding potential health effects and possible actions to reduce the levels of the contaminant(s) in your well water.

9. What should I test my well for?
If you live in an area that is susceptible to elevated levels of radon in groundwater or have other concerns about radionuclides, we suggest that you initially screen your well water for: gross alpha, gross beta, uranium, and radon.

The North Carolina Division of Public Health also recommends that all well owners test for bacteria annually, inorganic chemicals like arsenic every two years, and organic chemicals like pesticides and volatile organic compounds every five years.

10. If I want to get my well tested where can I go?
If you live in Wake County, contact the Wake County Environmental Health Department at 919-893-WELL or visit wakegov.com/wells.
If you live in Franklin County, contact Franklin County Environmental Health Department at 919-496-8100.

If you are not a resident of Franklin or Wake counties, you need to contact a certified laboratory. Here is a list of all the private labs that are certified by the NC State Laboratory of Public Health to test for uranium, gross alpha and gross beta – all the radionuclides of concern – as of July 2019:

Treatment	Uranium	Radium	Radon	Gross alpha	Gross beta
Ion Exchange	✓	✓			✓
Reverse Osmosis	✓	✓		✓	✓
Surface and Decay Storage			✓		
Aeration System			✓		
Granular Activiated Carbon			✓		

11. Are there treatment options for radionuclides in my well water?
There are treatment systems that can get rid of radionuclides in water; the type of system depends on the kind of radionuclide.

12. How much will it cost to fix the problem if tests find radionuclides in my well water?
If the testing indicates problems, it could cost from $1,000 to $15,000 to install the treatment system. The cost will depend on what the testing indicates and what approach you want to take to fixing it.
To discuss options, you can contact the Occupational and Environmental Epidemiology Branch (OEEB) in the North Carolina Department of Health and Human Services at (919)-707-5900. The OEEB can provide guidance and recommendations for treatment options to reduce contaminants detected in your well water.

13. What should I do if I think my health has been affected by contaminants identified in my results?
If you think your health has been affected by contaminant(s) identified in your well water, talk with your doctor about your specific concerns and share your well water results.

Lab Name	State	Address	Phone Number
EMSL Analytical, Inc.	NJ	200 Route 130; North Cinnaminson, NJ 08077	(800) 220-3675
Eurofins Eaton Analytical, Inc.	CA	750 Royal Oaks Drive Suite 100; Monrovia, CA 91016	(626) 386-1100
Eurofins Eaton Analytical, Inc. - South Bend	IN	110 South Hill Street South Bend, IN 46617	(574) 233-4777
Florida Radiochemistry Services, Inc.	FL	5456 Hoffner Avenue, Suite 201; Orlando, FL	(407) 382-7733
GEL Laboratories, LLC	SC	2040 Savage Road. Charleston, SC 29407	(843) 556-8171

Test kits may be purchased through the NC Radon Program at http://www.ncradon.org/Testing.html. For more information, please contact the NC Radon Program at (828) 712-0972.

NEWS and NOTES

Announcements

NC Public Health, Emergency Management and Health Care Officials Conducting Ebola Drill

Officials from the NC Department of Health and Human Services and the NC Department of Public Safety will be participating with federal, state and local officials in a in a multi-state Ebola Virus Disease (EVD) emergency preparedness exercise from Nov. 4-8, 2019. Coordinated at the state's Emergency Operations Center in Raleigh, the drill will involve local hospitals and health care agencies to simulate how public health, first responders and health care providers would respond if someone in North Carolina were to be diagnosed with Ebola virus disease.

Following the 2014-2016 Ebola Virus Disease outbreak, federal agencies provided special funding to ensure the nation's health care system is ready to safely and successfully identify, manage, and treat patients with Ebola or patients under investigation for Ebola. North Carolina has used these funds to collaboratively plan, train, equip and test the health care system and local public health partners on Ebola preparedness and response activities. As part of the exercise, it is possible that members of the public might see health care workers moving around their communities in protective gear, alongside ambulance, law enforcement and other Ebola-related response activities in counties across the state.

The largest Ebola outbreak took place in West Africa in 2014-2016 and resulted in more than 28,600 cases and 11,300 deaths. Although there has been an ongoing EVD outbreak in the Democratic Republic of Congo since August of 2018, the current risk to the US and North Carolina is very low.

NEWS and NOTES

Employee of the Quarter, Announcements

Employee of the Quarter: Alexis Barbarin, PhD

Communicable Disease Branch

The state of North Carolina has a tremendous disease burden due to tick borne illness. Dr. Barbarin has been instrumental in establishing the state vectorborne disease program in collaboration with her colleagues. In this role she has served as the subject matter expert on tick borne illness and provided oversight, technical expertise and guidance on a variety of issues.

Dr. Barbarin has led human tick borne illness surveillance activities in accordance with state and federal requirements. She has provided extensive support (including educational seminars and training) to our 85 local health departments and has also provided professional training (covering surveillance, diagnosis and treatment) to physicians and health care providers statewide.

Dr. Barbarin has also successfully applied for funding through the CDC Epidemiology and Laboratory Capacity grant, a key means by which many state health departments fund their activities. Through this she has secured funding to study distribution, seasonal occurrence, and pathogen detection in Ixodes scapularis ticks in an area of Lyme disease emergence in North Carolina and neighboring areas of Virginia and Tennessee. She has successfully contracted with multiple universities, both in and out of state, to accomplish this task, which has never been done in NC before.

In addition to these key functions Dr. Barbarin has excelled at outreach activities. She has worked collaboratively with the North Carolina Department of Agriculture and Consumer Services, Veterinary Division, to create the NC Tick Identification Program. Through this program veterinarians may submit any tick for identification. Again, this is a first for North Carolina and will help describe tick distribution across the state.

In addition Dr. Barbarin re-started the "Fight the Bite" educational campaign in our state in conjunction with the Governor's declaration of April 2018 as "Tick and Mosquito Awareness Month." This program was targeted to K-12 students to promote the importance of vector borne disease prevention; the contest encourages students to use artwork to promote the Fight the Bite theme. Details and winners can be seen here: https://epi.publichealth.nc.gov/cd/vector/contest.html.

Ultimately Dr. Barbarin is an outstanding employee and deserving of this recognition. Her experience with NC DHHS, and all or our key partners, gives her unique insight and understanding of educational and outreach needs of people in North Carolina. She has demonstrated capacity, here and in previous positions, to design projects and secure funding to accomplish them. Her professional and personal contributions to the health of North Carolinians cannot be overstated.

Communicable Disease Branch
(Epi 24/7 on-call)
919-733-3419

HIV/STD Program
919-733-7301
TB Program
919-733-3419

Occupational & Environmental and Epidemiology Branch
919-707-5900

Public Health Preparedness and Response
919-715-0919
PHPR Emergency 24/7
888-820-0520

Rabies Emergency
(Nights, Weekends, Holidays)
919-733-3419

State Laboratory of Public Health
919-733-7834

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State of North Carolina | North Carolina Department of Health and Human Services
North Carolina Division of Public Health | Epidemiology Section
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